



Hydraulic Fracturing: Authorities to Address Water Impacts

Presentation for OGC Law Clerks

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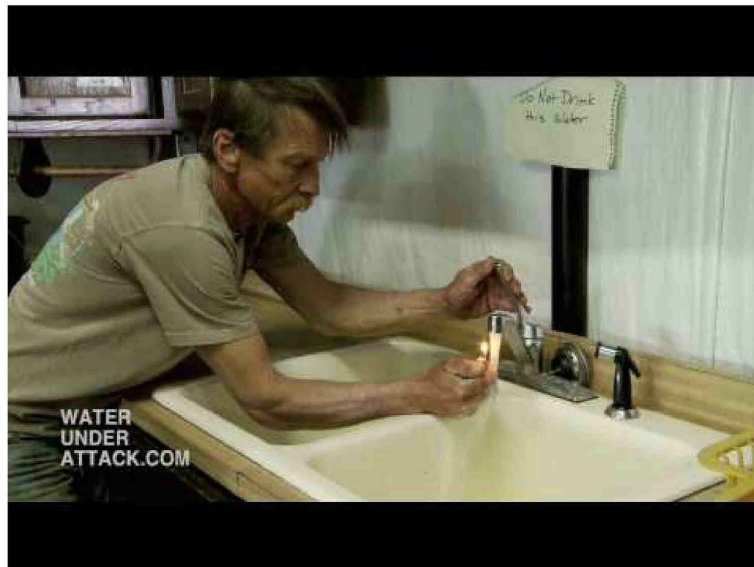
Water Law Office

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Pictured: natural gas well

Hydrofracking in the Media

- Can you do this with your tap water?
 - From the new documentary “Gasland.”



Hydrofracking in the Media

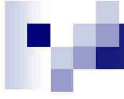
- Josh Fox, the director of “Gasland,” has been on various talk shows promoting his film, such as the Daily Show with Jon Stewart.



Hydrofracking in the Media

- “No fracking way!” chant protestors at anti-drilling rally on Cornell’s campus in December, 2009.





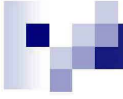
Overview of Presentation

- What is hydrofracking?
- What are the potential impacts to surface and groundwater?
- What authorities exist to address water-related impacts of hydrofracking?
- What has EPA done/ planning to do pursuant to these authorities?



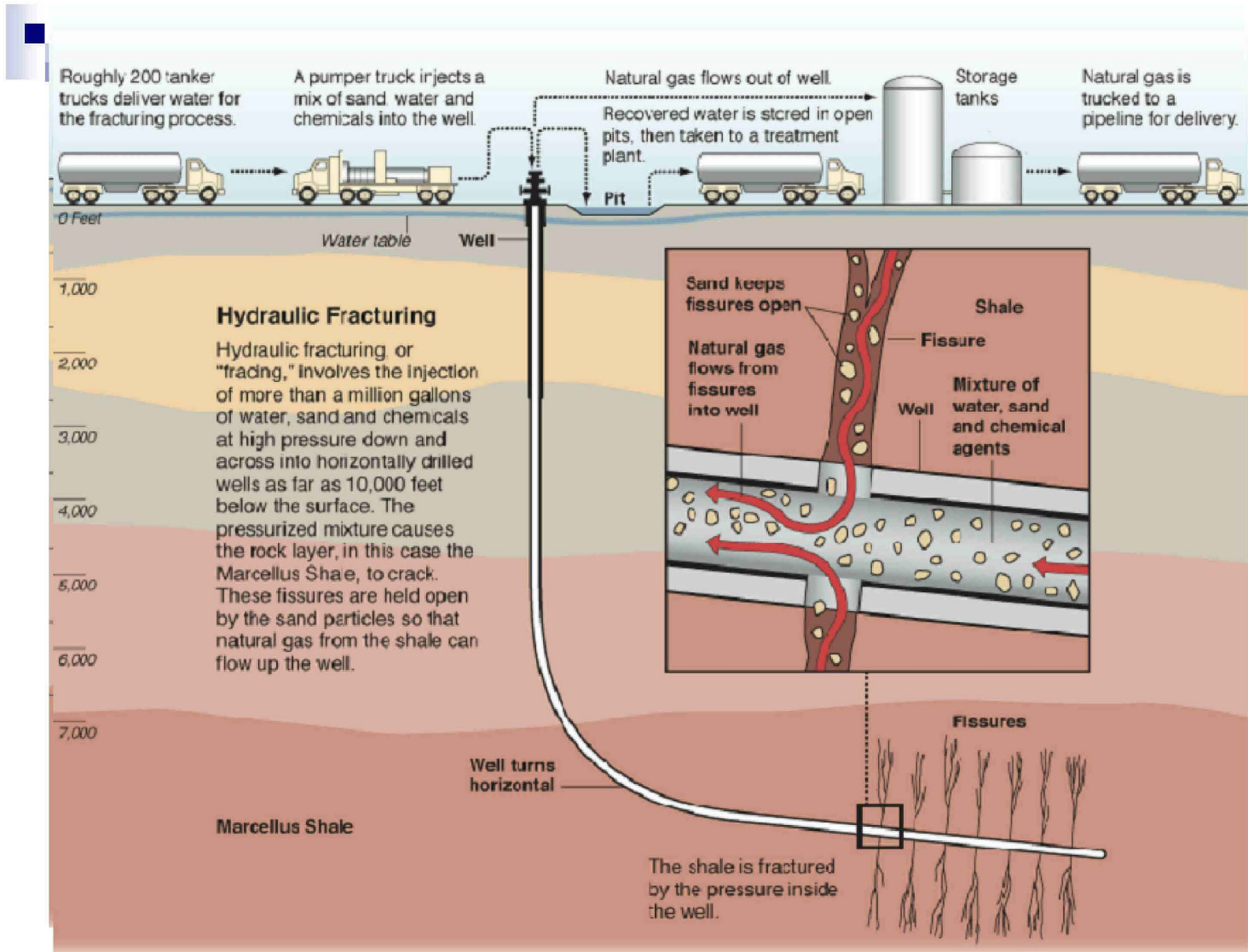
What is hydrofracking?

- Process of enhancing natural gas collection
- Hydrofracking creates fractures within rock formations, allowing the recovery of normally trapped pockets of natural gas
- Wells can be drilled vertically or horizontally
- Wells may extend to depths greater than 8000 feet
- Horizontal sections may extend several thousands of feet away from production pad

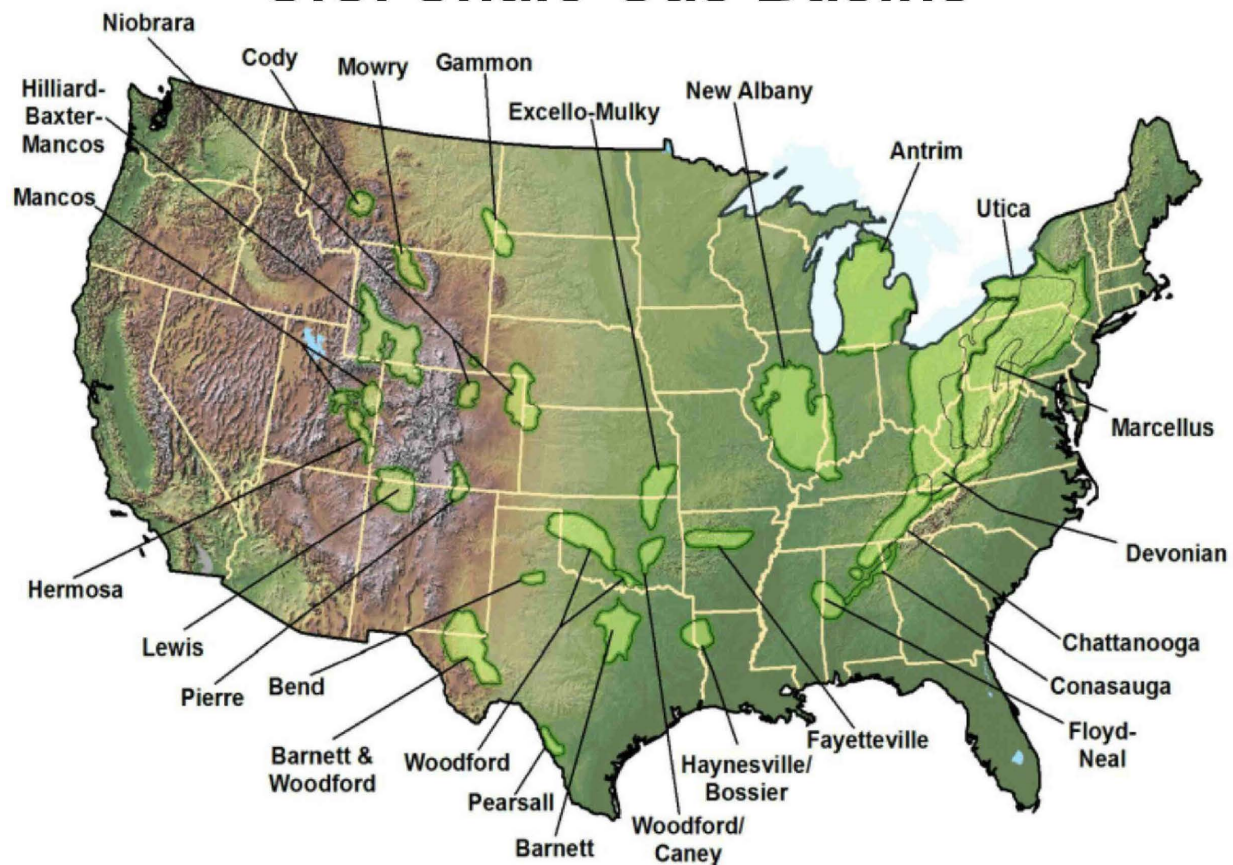


How does hydrofracking work?

- Step 1: Fracking fluid is injected down into wells at high pressure, creating fractures within the earth
 - The injected fluid is typically 99.5% water and sand
 - The sand acts as a proppant to keep fractures open
 - In addition to sand and water, more than 200 chemicals may be used in the fracking fluid: diesel, gels, foams, nitrogen, carbon dioxide, benzene, arsenic, etc.
 - Fracking fluid is considered trade secret and is kept confidential
- Step 2: The fluids are pumped back/recovered while the proppant remains in the fractures
- Step 3: Extraction of natural gas commences



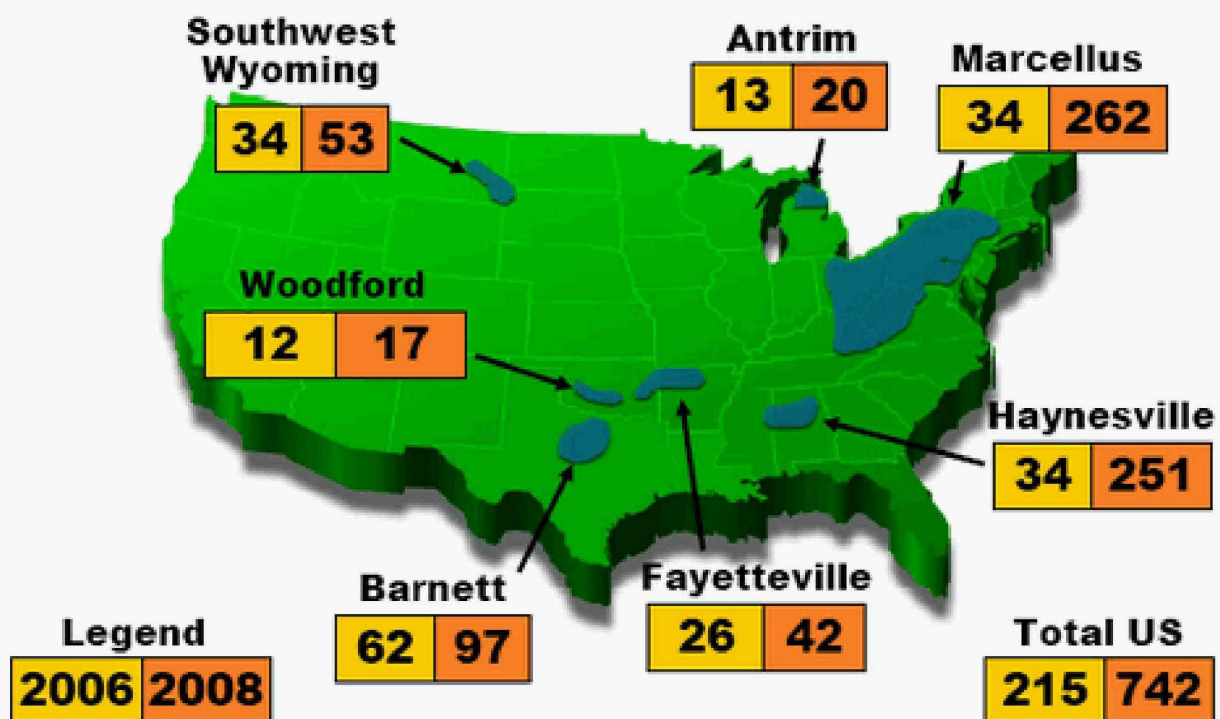
U.S. Shale Gas Basins



Source: Ground Water Protection Council and ALL Consulting, "Modern Shale Gas Development in the United States: A Primer" Prepared for U.S. Department of Energy Office of Fossil Energy and National Energy Technology Laboratory April 2009.

Growth in Recoverable Amounts of Natural Gas

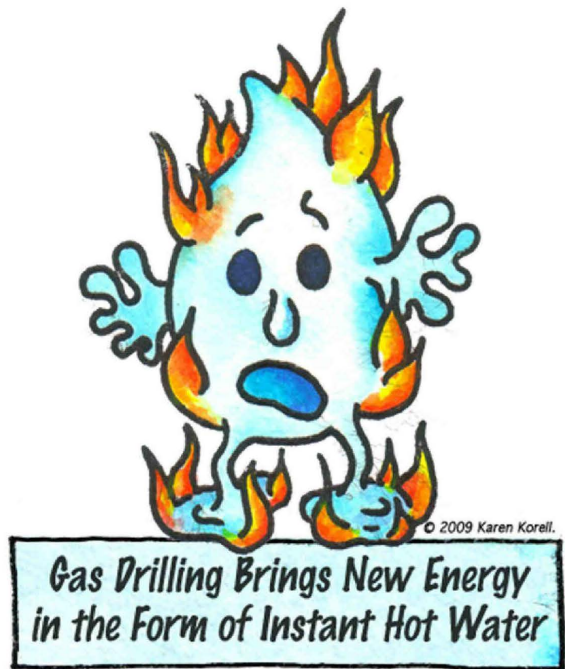
Estimated Recoverable NG For Select Shale Basins (TCF)



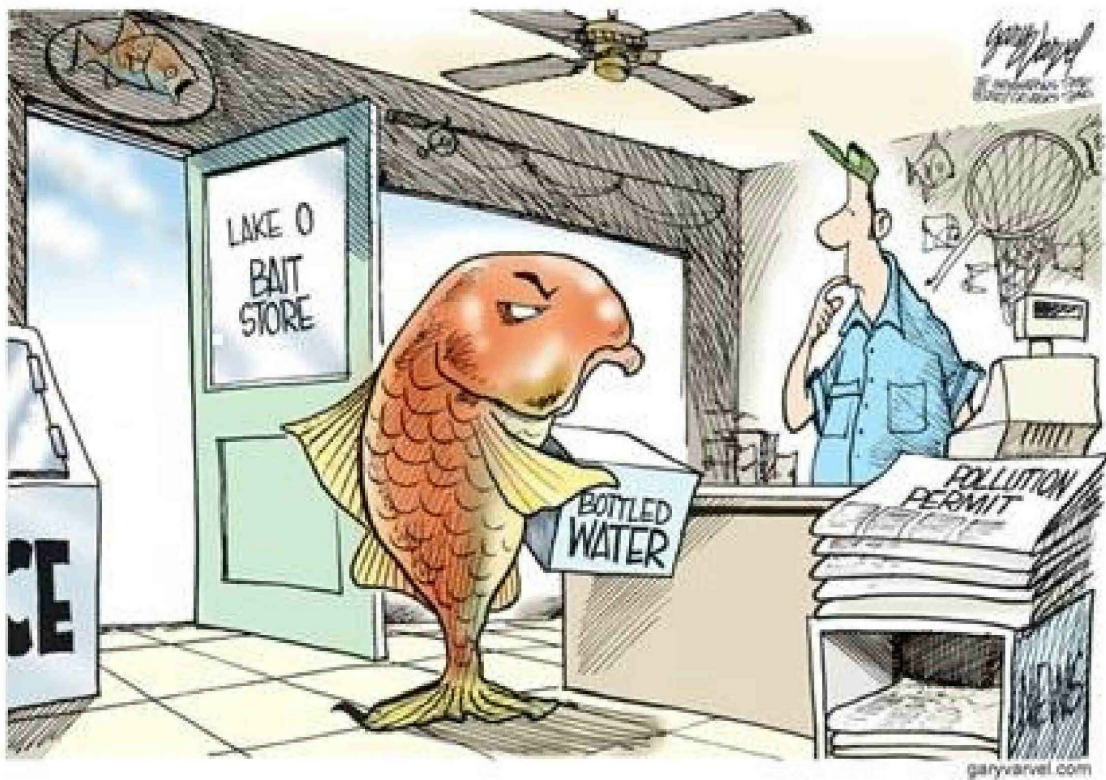
Source: Navigant Consulting, North American Natural Gas

What are the potential water-related impacts?

- Water shortages
- Contamination of aquifers
- Improper disposal of used fracking fluids



Water Shortages





Water Shortages

- Hydrofracking uses a lot of water
 - 50,000-350,000 gallons of water may be required to fracture one well in a coalbed formation while two to five *million* gallons of water may be necessary to fracture one horizontal well in a shale formation
 - A well may be fracked multiple times
- Hydrofracking may exacerbate the existing water shortages in the Western States

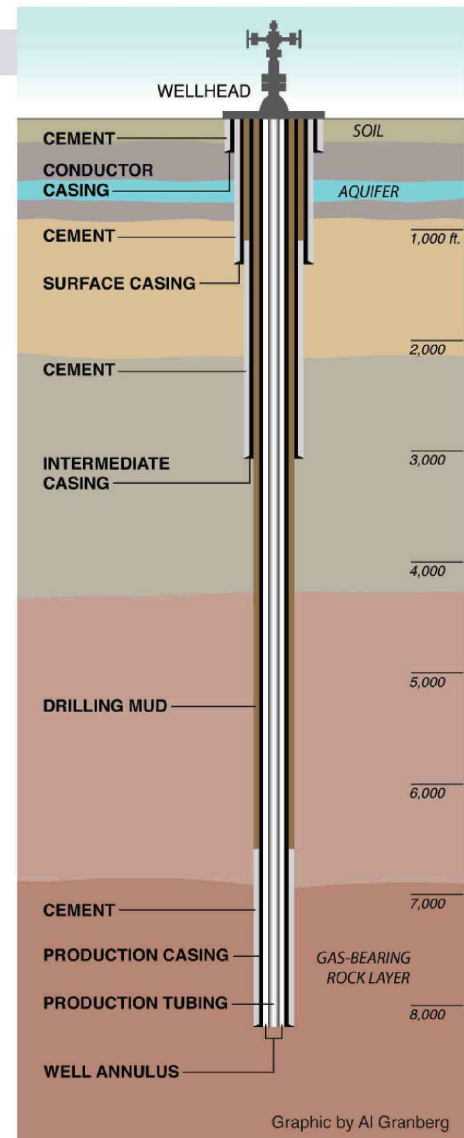


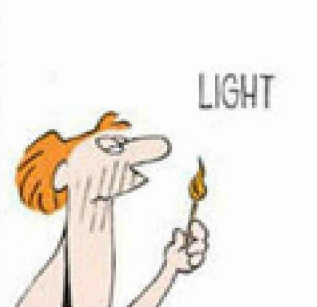
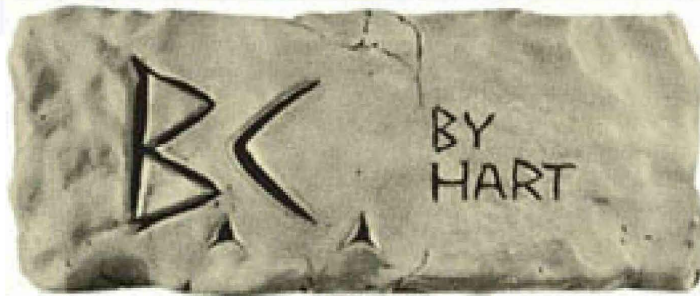
Contamination of Aquifers

- About 40% of fracking fluids remain underground and untreated, potentially leaking into underground sources of drinking water
- Reports of drinking water contamination due to hydrofracking in multiple States, including Texas, Wyoming, and Pennsylvania

Contamination of Aquifers

- Industry proponents claim: Contamination has been caused by leaks in cement casing and/or because of operator error – not by pressure from fracking causing migration from gas reserve.
- Up to 99% of fracking fluid is water
- More studies needed to determine actual effect of fracking on drinking water



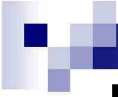




Pictured: fracking fluid evaporation pit

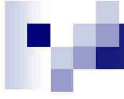


Pictured: fracking fluid evaporation pit and desolate surroundings



Improper Disposal of Used Fracking Fluids

- About 60% of fracking fluids are recovered and usually stored in evaporation pits at well sites before being disposed of or reused
 - The fluids have a very high salt content and pose a potential risk to the surrounding environment
 - A defective or damaged pit liner could lead to the contamination of local water supplies, allowing the salt content to rise to unacceptable levels
- Wastewater is often trucked to POTWs, many of which lack the capacity to treat these chemical wastes or handle such high volumes of wastewater.



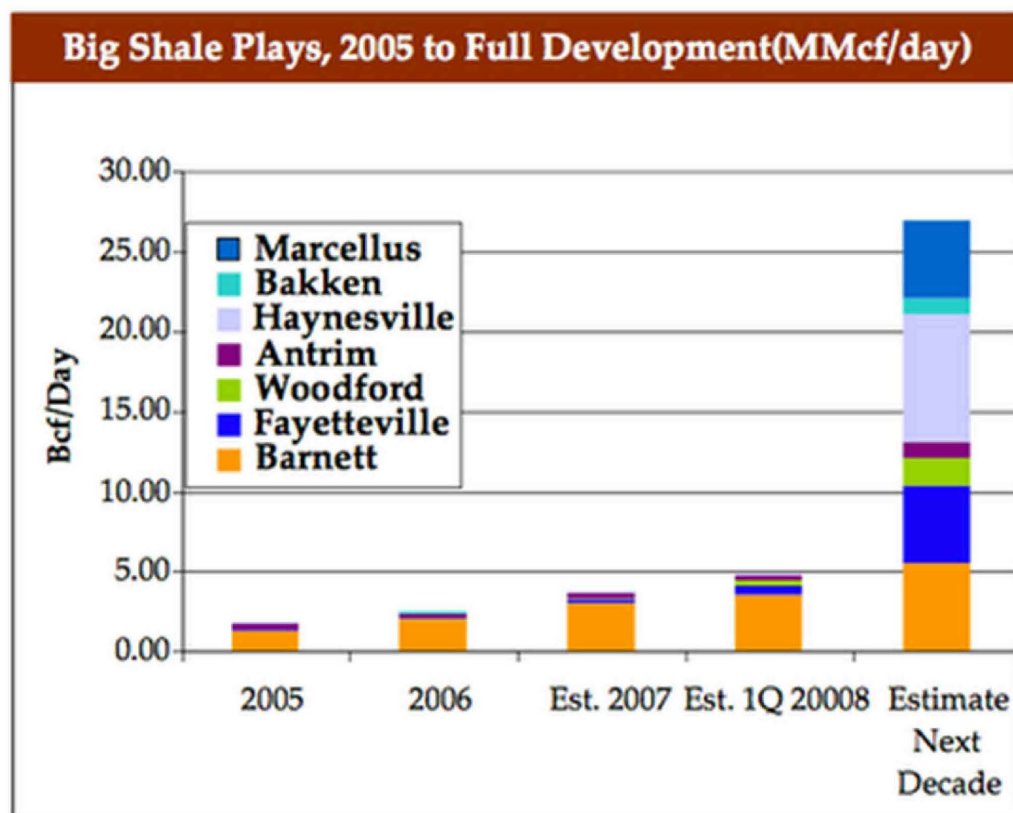
Other Environmental Impacts

- Typically two hundred large, diesel-fueled trucks are needed to transport water and supplies to the drilling site, resulting in significant amounts of air pollution
- Methane gas leaks from onsite storage tanks
- Drilling stations operate 24 hours a day, entailing constant artificial lighting and generation of noise, ultimately disturbing the natural habitats of plants and animals in the area.
- Hydrofracking may trigger seismic activity in areas surrounding drill sites.



Pictured: a fleet of trucks used to transport water and supplies to a hydrofracking site

Estimated Growth in Natural Gas Production



Sources: Producer interviews, analyst estimates, NCI calculations.

Legal Authorities to Address Water-Related Impacts of HydroFracking

- Safe Drinking Water Act
- Clean Water Act



Safe Drinking Water Act (SDWA)

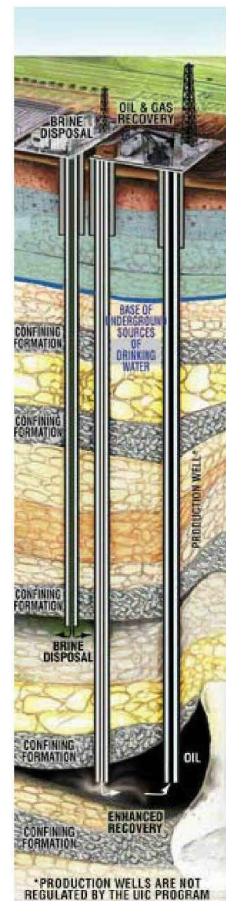
Underground Injection Control (UIC) Program

- Part of the SDWA requires EPA to develop minimum federal requirements for injection wells that prevent endangerment to underground sources of drinking water.
- The UIC Program is responsible for regulating the construction, operation, permitting, and closure of injection wells.



SDWA Underground Injection Control (UIC)

- There are 5 classes of underground injection wells. 40 CFR § 144.
- Class II: Oil and Gas Related Injection Wells
 - Class II wells inject fluids associated with oil and natural gas production.
 - The approximately 144,000 Class II wells in operation in the United States inject over 2 billion gallons of brine every day.



Class II Wells



SDWA Underground Injection Control (UIC)

- In 1997, the 11th Circuit held that injection of fluids as part of hydraulic fracturing constituted “underground injection” under SDWA. *Legal Environmental Assistance Foundation v. EPA*, 118 F. 3d 1467 (11th Cir. 1997)
- In 2001, the Court held that injection of hydraulic fracturing must be regulated as Class II wells. *Legal Environmental Assistance Foundation v. EPA*, 118 F. 3d 1467 (11th Cir. 1997)

2005 Energy Policy Act

- In 2005, Congress passed the Energy Policy Act, which exempted hydraulic fracturing from regulation under SDWA § 1421(d)(1).
 - Has been dubbed the “Halliburton Loophole”
- Now, “underground injection” excludes the underground injection of fluids or propping agents (other than diesel fuels) pursuant to hydraulic fracturing operations related to gas production activities.



**Industry Exemptions Endanger
Public Health and Safety**

**Cartoon opposing the 2005
Energy Policy Act**



Diesel Fuels Guidance

- In May, 2012, EPA issued a draft guidance document that:
 - Set forth EPA's interpretation of the term "diesel fuels"
 - Set forth EPA's interpretation that the Class II requirements applied to diesel fuels hydraulic fracturing (DFHF)
 - Provided recommendations for how to issue permits for DFHF consistent with our regulations.
- Currently taking public comment on the guidance (comment period ends July 9th)



SDWA Imminent and Substantial Endangerment

- “[T]he Administrator, upon receipt of information that a contaminant which is present in or likely to enter . . . an underground source of drinking water . . . which may present an imminent and substantial endangerment to the health of persons, and that appropriate State and local authorities have not acted to protect the health of such persons, may take such action as he may deem necessary in order to protect the health of such persons.” SDWA § 1431.
- Actions may include:
 - Issuing orders to protect users of the water, such as requiring the provision of alternate water supplies by persons who caused or contributed to the endangerment
 - Commencing a civil action for appropriate relief, including a restraining order or permanent or temporary injunction



Clean Water Act (CWA)

- EPA regulations (“effluent guidelines”): zero discharge of wastewater from onshore oil and gas extraction.
- To meet zero discharge, wastewater can be recycled/reused, injected underground, or trucked to treatment plants (CWTs or POTWs) for disposal.
- CWT regulations may not necessarily require treatment of fracking-related chemicals
- Also, POTWs may lack the capability of treating fracking-related chemicals in the wastewater from fracking operations.
- Statutory exemption for stormwater runoff from most oil and gas activities. CWA 402(l)(2).



What is EPA doing to address water impacts from fracking?

- SDWA
 - Working on finalizing diesel fuels guidance
 - Will be requiring fracking operations using diesel fuels to obtain Class II UIC permits (in states where EPA is the permitting authority)
 - Possibility of issuing 1431 orders to address imminent and substantial endangerments
- CWA
 - Developing regulations known as “pretreatment standards” that would establish limitations on wastewater that is sent to POTWs
- Other:
 - ORD study: EPA’s Office of Research and Development has launched an extensive multi-year study on the risks associated with HF. Also, Pavillion study is continuing.